AD-A101 174 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. N.J. NO NAME DAM NUMBER 53 (NJ0080--ETC(U)
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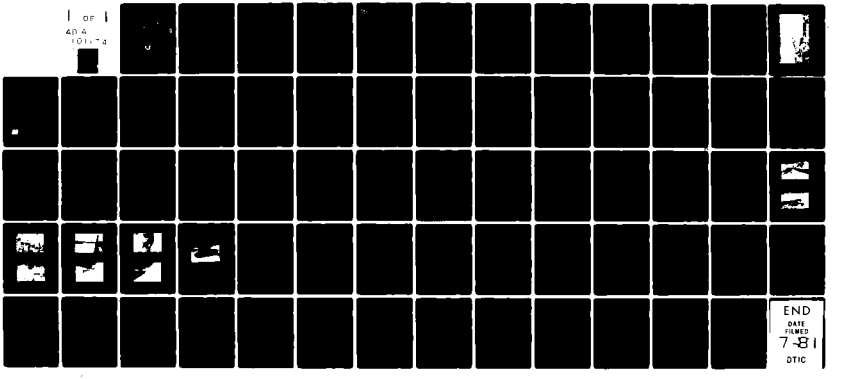

LEVEL II

AD A101174

PASSAIC RIVER BASIN
TRIBUTARY OF WHIPPANY RIVER
MORRIS COUNTY
NEW JERSEY

N.J. NO NAME
DAM NO. 53
NJ 00809

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DACW61-79-C-0011

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

REPT. NO: DAEN/NAP-53842/NJ00809-81/03

MARCH 1981

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DAEN/NAP-53842/NJ00809-81/03	2. GOVT ACCESSION NO.: AD-A101174
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Phase I Inspection Report National Dam Safety Program. N.J. No Name Dam No. 53 Morris County, New Jersey	5. TYPE OF REPORT & PERIOD COVERED: FINAL rept.
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Yu, K. Peter, P.E.	8. CONTRACT OR GRANT NUMBER(s): DACW61-79-C-0011
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Langan Engineering Assoc. Inc. 990 Clifton Ave. Clifton, N.J. 07013	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: NJ Department of Environmental Protection Division of Water Resources P.O. Box CN029 Trenton, NJ 08625	12. REPORT DATE: March 1981
	13. NUMBER OF PAGES: 65
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, PA 19106	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program	Flume
Embankments	N.J. No Name Dam No. 53, N.J.	
Visual Inspection	Spillways	
Structural Analysis	Concrete slab	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

15 JUN 1981

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for N.J. No Name No. 53 Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, N.J. No Name No. 53 Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 72 percent of the Probable Maximum Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated.

b. The following remedial actions should be initiated within three months from the date of approval of this report:

(1) Remove all debris and vegetated growth in the flume and the discharge channel.

(2) Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

c. The following remedial actions should be initiated within six months from the date of approval of this report:

(1) Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments.

(2) Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.

(3) Repair and provide proper protection against further erosion along the east side of the secondary dike.

(4) Repair the crest and slope of the dike in the area near the spillway.

d. The following remedial actions should be initiated within one year from the date of approval of this report:

(1) Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

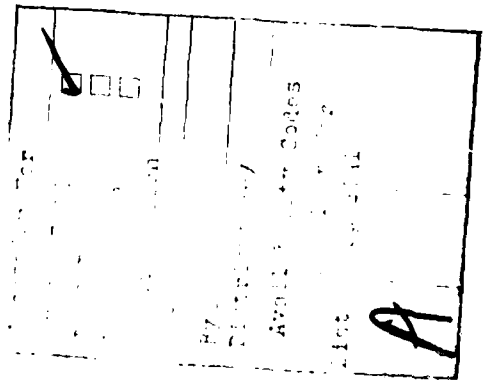
(2) Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of the inspection.

e. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

f. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within three months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congresswoman Fenwick of the Fifth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.



NAPEN-N
Honorable Brendan T. Byrne

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

JAMES G. TON
Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

N.J. NO NAME NO. 53 DAM (NJ00809)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 26 and 29 August and 11 and 12 November 1980 by Langan Engineering Associates, Inc., under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

N.J. No Name No. 53 Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 72 percent of the Probable Maximum Flood would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial measures to ensure spillway adequacy should be initiated.

b. The following remedial actions should be initiated within three months from the date of approval of this report:

(1) Remove all debris and vegetated growth in the flume and the discharge channel.

(2) Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

c. The following remedial actions should be initiated within six months from the date of approval of this report:

(1) Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments.

(2) Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.

(3) Repair and provide proper protection against further erosion along the east side of the secondary dike.

(4) Repair the crest and slope of the dike in the area near the spillway.

d. The following remedial actions should be initiated within one year from the date of approval of this report:

(1) Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

(2) Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of the inspection.

e. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam within one year from the date of approval of this report.

f. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within three months from the date of approval of this report.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
Commander and District Engineer

DATE: 15 June 1981

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	NJ NO NAME 53
ID NUMBER:	FED ID No NJ 00809
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	MORRIS
STREAM:	TRIBUTARY OF WHIPPANY RIVER
RIVER BASIN:	PASSAIC
DATE OF INSPECTION:	AUGUST & NOVEMBER 1980

ASSESSMENT OF GENERAL CONDITIONS

No Name 53 Dam, classified as having high hazard potential, is in fair overall condition. No evidence of seepage in the downstream embankment and no evidence of unusual movement of the embankment was observed during our inspection. However, certain deficiencies do exist in the dam and reservoir area. Brush and trees have overgrown on the lower portion of the downstream slope. Animal burrows exist in both the dam and the dike embankments. Erosion has occurred along the unprotected east side of the dike due to the existence of the stream along its toe. The surface of the dike is uneven with significant erosion occurring near the dike and spillway junction. The discharge flume structure is in a deteriorated condition and occasional obstructions exist along its channel. The discharge channel appears to have been used as a dump. The operating condition of the emergency low level outlet is uncertain and the access to the control is unsafe. There is virtually no available information on the design, construction, and operation of the dam. Additional investigation is necessary to adequately evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is inadequate for the PMF. We estimate the dam can adequately pass about 71% of the PMF.

The following are recomended to be done very soon:

Remove all debris and vegetated growth in the flume and the discharge channel. Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

The following are recommended to be done soon:

Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments. Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure. Establish a warning system. Repair and provide proper protection against further erosion along the east side of the secondary dike. Repair the crest and slope of the dike in area near the spillway.

The following are recommended to be done in the near future:

Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay. Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of our inspection. The spillway capacity is estimated to be inadequate for the PMF. The SDF and the actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. If necessary, steps should be taken to increase the spillway capacity or to keep the normal pool at a lower elevation so that sufficient storage is available for the SDF.

K. Peter Yu, P.E.

OVERALL VIEW

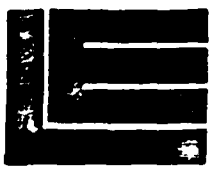
NJ NO NAME 53 DAM

29 August 1980

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	NJ NO NAME 53
ID NUMBER:	FED ID No NJ 00809
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	MORRIS
STREAM:	TRIBUTARY OF WHIPPANY RIVER
RIVER BASIN:	PASSAIC
DATE OF INSPECTION:	AUGUST & NOVEMBER 1980



LANGAN ENGINEERING ASSOCIATES, INC.

Consulting Civil Engineers
990 CLIFTON AVENUE
CLIFTON, NEW JERSEY
201-472-9366

CONTENTS

NATIONAL DAM SAFETY REPORT

NJ NO NAME 53 FED ID NO NJ 00809

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

SECTION 1 PROJECT INFORMATION

1.1 General

Authority to perform the Phase I Safety Inspection of N.J. No Name 53 Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 August 1980. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the US Army Engineer District, Philadelphia.

The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to safety of N.J. No Name 53 Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations and analyses are necessary and warranted. The assessment is made using screening criteria established in Recommended Guidelines for Safety Inspection of Dams prepared by the Department of Army, Office of the Chief of Engineers. It is not the purpose of the inspection report to imply that a dam meeting or failing to meet the screening criteria is, per se, certainly adequate or inadequate.

1.2 Project Description

a. Description of Dam and Appurtenances

No Name 53 Dam is a 55-year old 350-ft long earthfill dam with a crest width of approximately 15 ft. It was reported to be 50 ft high but was field checked to be about 35 ft high. A wide berm measuring 20 ft to 70 ft exists on the downstream slope about 9 to 10 ft below the crest. The upstream slope is riprapped to within 1 ft of the crest and is approximately 3H:1V. The downstream slope is variable, typically 2H:1V above the berm and varies from about 3H:1V to 1H:1V below the berm. A concrete core wall reportedly exists in the dam.

An earth dike oriented perpendicular to the axis of the dam forms the eastern boundary of the reservoir locally known as Jockey Hollow Reservoir. The dike is about 700 ft long and 10 to 15 ft wide at the top. It is 3 to 4 ft above the channel bottom of a brook flowing along the east side of the dike. The west slope of the dike is typically 3H:1V and the east slope is about 1H:1V. The height of the dike is between 1 and 8 feet above the spillway flashboard tops at the north and south ends respectively.

A concrete spillway, 15 ft wide, connects the dam embankment and the earth dike. Discharge at the spillway is controlled by 2 1/2-in thick wood flashboards placed to 4 ft above the spillway crest. There is a 4 ft wide concrete walkway about 4 1/2 ft above the crest of the spillway. It is supported by the concrete spillway side walls. There is a concrete flume immediately below the spillway which conveys the discharge from the reservoir and the brook to a stream bed downstream of the dam.

The impounded water of Jockey Hollow Reservoir is transmitted by means of gravity flow from Clyde Potts Reservoir which is located about 9 miles to the northwest. The water enters Jockey Hollow Reservoir by means of 3 aerators located at the upstream end. A pump station is located near the southwest corner of the reservoir. This pump station is reportedly not used in relation to the reservoir but is used to divert portions of the influent water to two elevated storage tanks in the vicinity.

The capacity of the reservoir is reported to be about 23 million gallons (70 acre-ft) and is used as a municipal water supply. The water is distributed by means of gravity flow through a valved 12-inch effluent pipe located underneath the dam embankment. The control valve is located in a pit near the downstream toe of the lower embankment. A chlorination house is located about 60 ft downstream of the valve pit. Average normal daily consumption rate is reported to be 0.7 million gallons but increases to as much as 1.2 to 1.4 million gallons per day in the summer months.

An emergency low level outlet consisting of one 12-inch-dia valved pipe is reportedly located to the east of the effluent pipe. Its control valve is located at the bottom of an enclosed shaft at the north edge of the downstream berm. A 12 inch metal stand-pipe exists at about the midpoint of the upper dam embankment on the upstream side. This pipe was originally installed as an observation pipe to indicate any backwater into the reservoir from the water supply system. The pipe is reported to be nonfunctional.

The essential features of the dam are given in Figures 2 and 3.

b. Location

No Name 53 Dam is located at the north end of the reservoir which is situated approximately 1/2 mile southwesterly of Morristown on Western Avenue in Morris Township, Morris County, New Jersey. It is at north latitude 40° 47.3' and west longitude 74° 29.9'. A regional vicinity map is given in Figure 1.

c. Size Classification

No Name 53 dam is classified as being "small" on the basis of its maximum reservoir storage volume of 73 ac ft, which is more than 50 ac ft, but less than 1000 ac ft. It is also classified as "small" on the basis of its maximum height of 35 ft, which is less than 40 ft. Accordingly, the dam is classified as "small" in size.

d. Hazard Classification

In the National Inventory of Dams, No Name 53 Dam has been classified as having "High Hazard Potential" on the basis that failure of the dam would cause excessive property damage to residences downstream and could cause more than a few deaths. Visual inspection of the downstream area shows that failure of the dam would potentially cause excessive property damage and loss of life to a heavily populated area approximately 3000 ft downstream of the dam. Accordingly, it is proposed to keep the Hazard Classification as "High".

e. Ownership

The dam and reservoir are owned by the Southeast Morris County Municipal Utilities Authority, 101 Western Avenue, Morristown, N. J. 07960.

f. Purpose of Dam

The present purpose of the dam is to impound water for use as municipal water supply for Morristown, N. J.

We were informed by the Municipal Utilities Authority personnel that the reservoir service will soon be replaced by two 3-million gallon tanks currently under construction. No future plan for the present reservoir has yet been established.

g. Design and construction history

A brief description on the features and history of the dam and reservoir is on file in the office of the Southeast Morris County Municipal Utilities Authority. However, no detailed design and construction history records are available.

Exhibit P-7 "Detailed Inventory and Original Cost of Property in Plan as of Dec. 31, 1971", available from the above office, describes that the reservoir was formed by an earth and concrete core wall dam and an earth dike to impound water transmitted from Clyde Potts Reservoir. The reservoir formed has a capacity of 23 million gallons with a water surface area of 4 acres. The Exhibit also indicates that a smaller distribution reservoir was constructed at the site about 1880 and was used until reconstruction work of the present dam and dike was begun in 1925 and completed in 1926.

h. Normal Operational Procedures

The normal operational procedures are limited to daily visual inspection of the reservoir and appurtenances. Routine operations consist primarily of regulating the water level in the reservoir and monitoring flow pressures of the piping system in the pump station.

1.3. Pertinent Data

a. Drainage Areas	6.5 Acres (0.01 sq mi)
b. Discharge at Damsite	
Maximum known flood at damsite	Unknown
Total spillway capacity at max. pool elevation	22 cfs (Flashborad in place)

c. Elevation (ft)

Note: Data obtained from field measurement using El 503.13 at the crest of the spillway

Top Dam	El 508.02 (low point)
Maximum pool-design surcharge	El 508.02 (Assumed to be top of dam)
Normal Pool	El 507.3 (Top of flash-boards)
Top of flashboards over spillway crest	El 507.3
Spillway crest	El 503.13
Streambed at centerline of dam	Approx El 473
Maximum tailwater	Unknown. No water discharged from reservoir at time of inspection

d. Reservoir

Length of maximum pool	Approx 705 ft
Length of normal pool	Approx 700 ft

e. Storage (acre-feet)

Normal	70 Ac-ft
Top of dam	73 Ac-ft

f. Reservoir Surface (acres)

Top dam	4.06 Ac
Maximum pool	4.06 Ac (Assumed top of dam)
Normal pool (Top of flashboards)	4 Ac

g. Dam

Type	Earthfill
Length	350 ft
Height	35 ft
Top Width	15 ft typical

	Side Slopes	D/S Approx 2H:1V U/S Approx 3H:1V
	Zoning	Unknown
	Impervious Core	Concrete core wall reported to exist
	Cutoff	Unknown
	Grout curtain	Unknown
h.	Spillway	
	Type	Overfall; flashboard over crest of concrete weir
	Length of weir	15 ft
	Crest elevation	El 507.3 (Top of flashboard) El 503.13 (Crest of concrete weir)
	Gates	None
	U/S Channel	Concrete wing walls
	D/S channel	Concrete discharge flume
i.	Regulating Outlets	Reported to exist: One 12-in effluent pipe for water supply. Valve in pit at downstream toe. One 12-in emergency low level outlet pipe. Valve at bottom of shaft on north edge of downstream berm. Outlet not located.

SECTION 2 ENGINEERING DATA

There is no engineering data available concerning the design construction or operation of No Name 53 dam.

SECTION 3 VISUAL INSPECTION

No Name 53 dam is in fair overall condition. The main dam embankment on the north side and the dike on the east side of the impoundment form a reservoir which has virtually no upstream drainage area. On-site inspections were made in August and November 1980. The visual inspection check list and selected photographs are included in Appendices 1 and 2, respectively.

The portion of the dam embankment above the downstream berm is covered with grass and brush and appears in fair condition. Animal burrows in the embankment were found. The downstream embankment below the berm has slopes varying from approximately 3H:1V to 1H:1V and is vegetated with trees and brush. The upstream embankment is riprapped to within 1 ft of the crest.

The extent of the riprap below the water surface is not certain.

The earth dike along the east side of the reservoir is vegetated with brush and grass and appears in poor condition. The crest surface is uneven and significant erosion has occurred in the area near the junction of the dike and the spillway. An animal burrow was found on the crest of the dike. The stream channel which flows along the east toe of the dike is about 3 to 4 ft below the crest. There is no toe or slope protection along the east side of the dike and significant erosion has occured. The west slope of the dike is riprapped to near the normal pool level.

Cracks and spalled concrete were observed on the spillway structure. The channel floor of the discharge flume structure has deteriorated. The concrete channel linings have disintegrated in some places and trees and brush grow out of the channel floor. The discharge flume and channel are obstructed by much debris including sand, scattered boulders, piles of asphalt, and metal pipes. The channel appears to be have been used as a dump.

All reservoir slopes are riprapped to about normal pool level. Moderate siltation was observed upstream of the spillway.

SECTION 4 OPERATIONAL PROCEDURES

Operational procedures are reported to include daily visual inspection of the reservoir and appurtenances. Routine operations consist primarily of regulating the water level in the reservoir and monitoring flow pressures of the piping system in the pump station. The normal pool is maintained at or just below the top of the flashboards (el 507.3).

Maintenance of the dam is limited to grass cutting and landscaping care. Repairs on appurtenances are made as determined to be necessary.

No warning system for the dam and reservoir is known to exist.

SECTION 5 HYDRAULIC/HYDROLOGIC

No Name 53 dam and reservoir have virtually no upstream drainage area. The catchment area involves the reservoir surface and a relatively small strip of

ground around it. However, due to the limited available freeboard (0.72 ft) above the normal pool, the reservoir has insufficient storage capacity for the Probable Maximum Precipitation (PMP). Therefore, a reservoir routing was performed.

The hydraulic/hydrologic evaluation is based on a Spillway Design Flood (SDF) equal to the full Probable Maximum Flood (PMF) chosen in accordance with the recommended guidelines for a dam classified as high hazard and small in size. Hydrologic design data for this dam was not available. The PMF has been determined by the PMP of 22.3 inches (200 sq. mi. - 24 hour). The PMP was directly converted to an inflow hydrograph and a routing was performed. Hydrologic computations are presented in Appendix 3. The PMF peak inflow determined for the subject watershed is 50 cfs.

The capacity of the spillway at pool elevation equal to the low point of the dam embankment (El 508.02) is 22 cfs which is less than the SDF. Flood routing indicates the dam will overtop by approximately 0.06 ft for the PMF and is inadequate. We estimate the dam can adequately pass about 71% of the PMF.

The drawdown facilities include the 12-inch dia water supply effluent pipe, which is continuously operating, and the 12-inch dia emergency low level outlet.

The operational condition of the emergency outlet is not certain. Drawdown of the reservoir has been evaluated assuming that both pipes are in operating condition and the flashboard of the spillway is in place to keep a normal pool at el 507.3. Our calculations indicate that the lake level could be lowered 5 ft in about 1 1/2 days and 10 ft in about 2 1/2 days.

SECTION 6 STRUCTURAL STABILITY

Our visual observations indicate no evidence of immediate instability of the embankments exist under normal operating conditions. However, the downstream slope of the main dam appears to be steep in some areas but no evidence of unusual movement or seepage was observed. The existence of the reported concrete core wall has not been physically verified and its vertical and longitudinal extent is unknown. The alignment of the dike along the east side of the reservoir indicates an unsatisfactory condition. There is erosion occuring along the entire unprotected east slope of the dike where a stream flows.

No engineering data concerning the design and construction of the dam or the engineering properties of the dam and foundation materials is available. There is also no knowledge on any post construction changes. No operating records other than water level elevations have been kept.

Due to lack of engineering information, analysis of the degree of stability of the dam cannot be made without gross assumptions as to the engineering properties of the dam and foundation materials.

The dam is located in Seismic Zone I of the Seismic Zone Map of the Contiguous States. Due to the steep downstream slope and the poor condition of the discharge flume structure, the dam embankment and the spillway structure may be unstable under earthquake loading and such conditions should be further evaluated.

SECTION 7 ASSESSMENT, RECOMMENDATION/REMEDIAL MEASURES

7.1 Dam Assessment

No Name 53 Dam is in fair overall condition. No evidence of seepage in the downstream embankment and no evidence of unusual movement of the embankment was observed during our inspection. However, certain deficiencies do exist in the dam and reservoir area.

Brush and trees have overgrown on the lower portion of the downstream slope. Animal burrows exist in both the dam and the dike embankment. Erosion has occurred along the unprotected east side of the dike due to the existence of the stream along its toe. The surface of the dike is uneven with significant erosion occurring near the dike and spillway junction.

The discharge flume structure is in a deteriorated condition and occasional obstructions exist along its channel. The discharge channel appears to have been used as a dump. The operating condition of the emergency low level outlet is uncertain and the access to the control is unsafe.

There is virtually no available information on the design, construction, and operation of the dam. Additional investigation is necessary to adequately evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is inadequate for the PMF. We estimate the dam can adequately pass about 71% of the PMF.

7.2 Recommendations/Remedial Measures

The following are recomended to be done very soon:

1. Remove all debris and vegetated growth in the flume and the discharge channel.

2. Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

The following are recommended to be done soon:

1. Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments.

2. Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.

3. Establish a warning system.

4. Repair and provide proper protection against further erosion along the east side of the secondary dike.

5. Repair the crest and slope of the dike in area near the spillway.

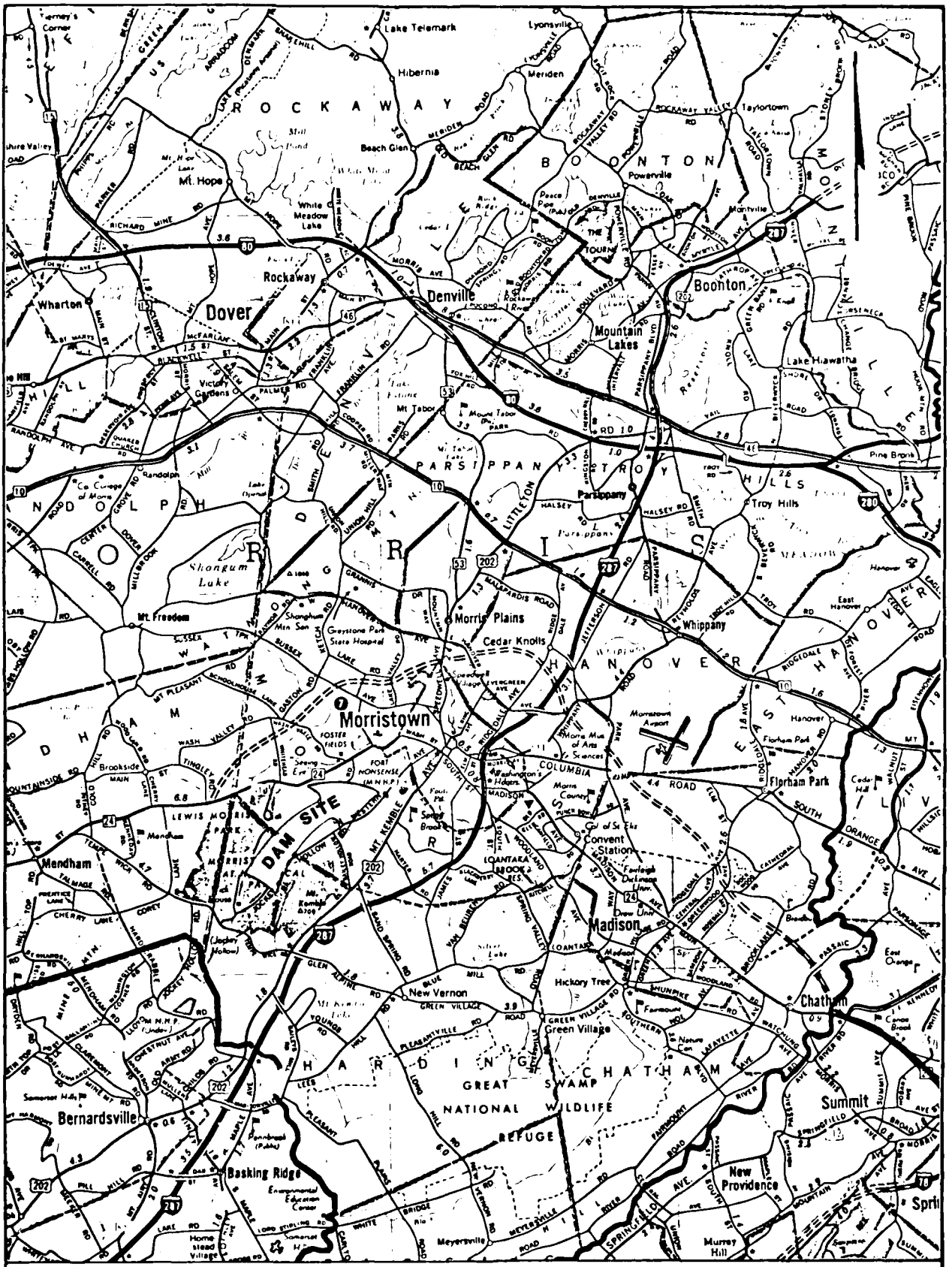
The following are recommended to be done in the near future:

1. Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

2. Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of our inspection.

3. The spillway capacity is estimated to be inadequate for the PMF. The SDF and the actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. If necessary, steps should be taken to increase the spillway capacity or to keep the normal pool at a lower elevation so that sufficient storage is available for the SDF.

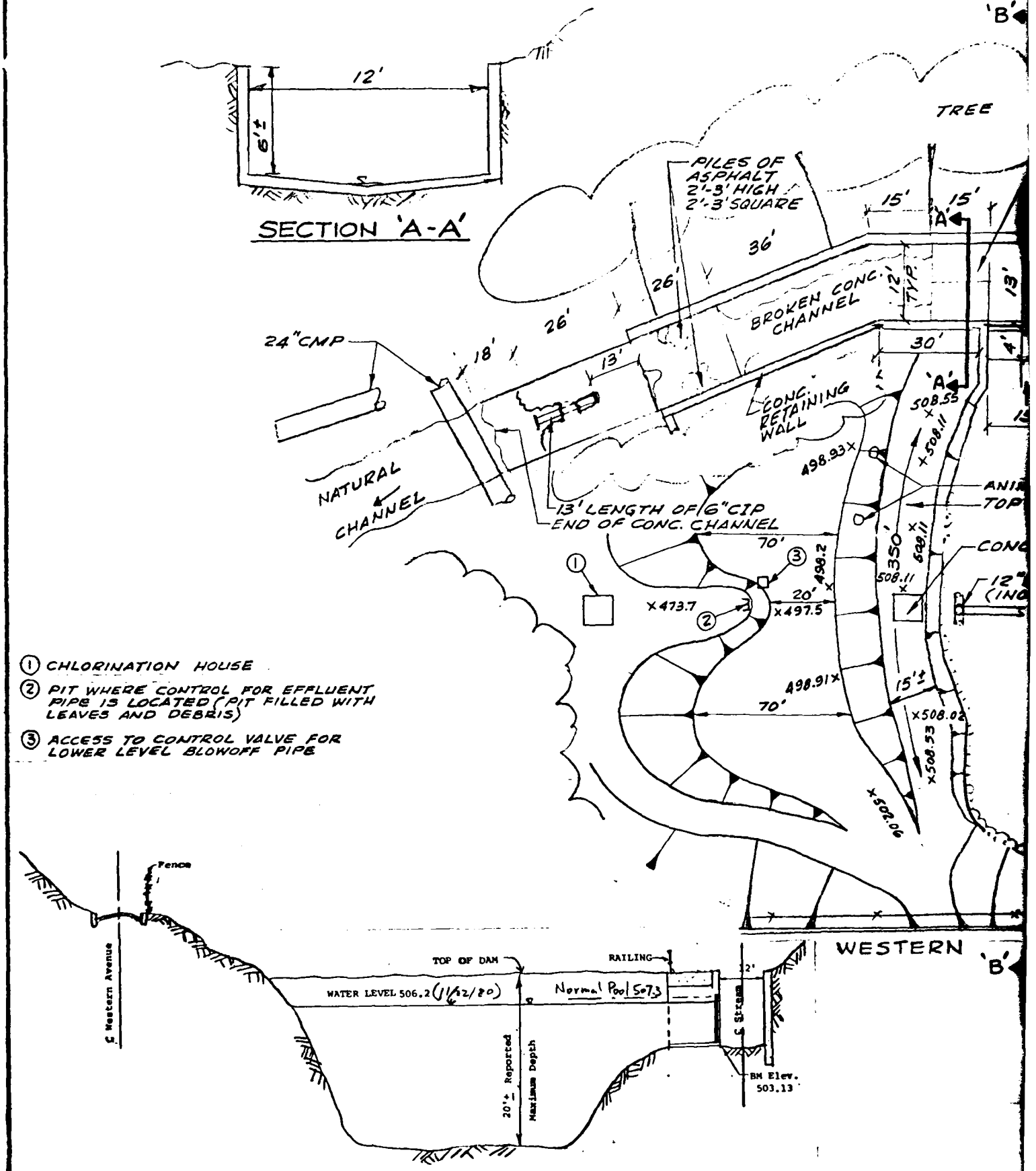
FIGURES

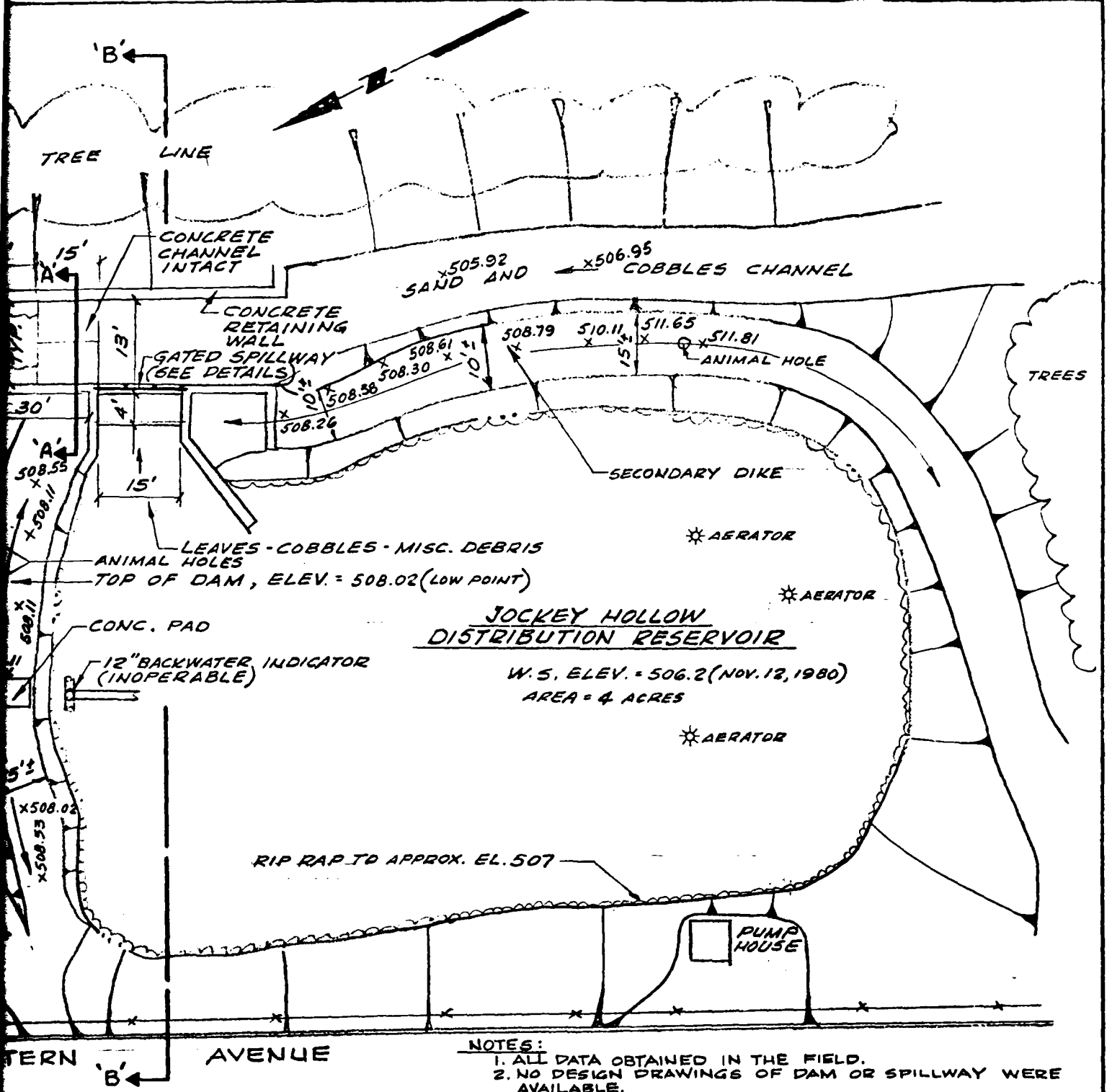


BY ____ DATE ____ REGIONAL VICINITY MAP JOB NO. 80145

CKD ____ DATE ____ NO NAME 53 FIG. No. 1

SCALE: 1" ≈ 2 MILE


12'
6'±
SECTION 'A-A'
'B'
TREE
PILES OF ASPHALT 2'-3' HIGH 2'-3' SQUARE
15'
'A'
36'
26'
BROKEN CONC. CHANNEL
12' TYP.
13'
24"CMP
18'
26'
13'
30'
CONC. RETAINING WALL
508.55
508.11
498.93
NATURAL CHANNEL
13' LENGTH OF 6"CIP END OF CONC. CHANNEL
70'
350'
498.2
20'
473.7
497.5
498.91
15'±
508.02
508.53
WESTERN
'B'
① CHLORINATION HOUSE
② PIT WHERE CONTROL FOR EFFLUENT PIPE IS LOCATED (PIT FILLED WITH LEAVES AND DEBRIS)
③ ACCESS TO CONTROL VALVE FOR LOWER LEVEL BLOWOFF PIPE
Fence
℄ Western Avenue
TOP OF DAM
RAILING
WATER LEVEL 506.2 (11/12/80)
Normal Pool 507.3
12'
℄ Stream
20'± Reported Maximum Depth
BM Elev. 503.13
SECTION B-B



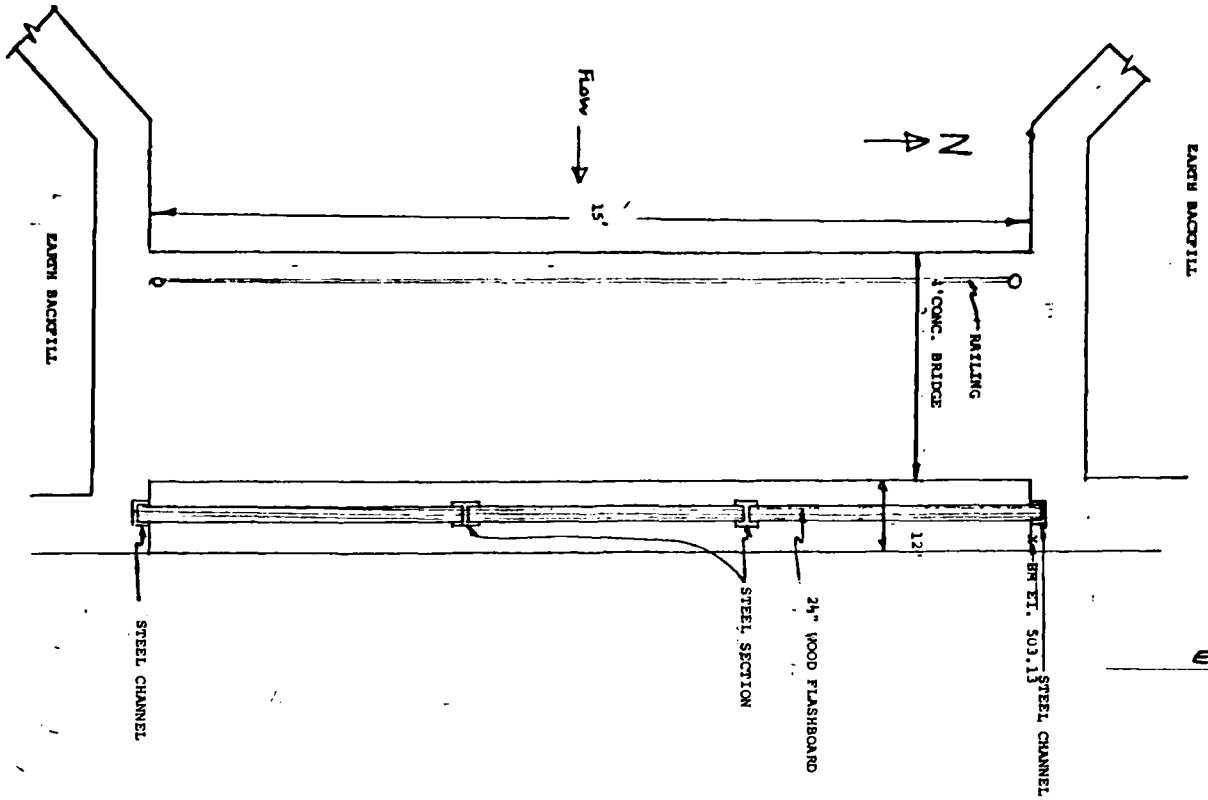
PLAN

NOTES:
1. ALL DATA OBTAINED IN THE FIELD.
2. NO DESIGN DRAWINGS OF DAM OR SPILLWAY WERE AVAILABLE.
3. ALL ELEVATION ARE REFERENCED TO THE TOP OF THE SPILLWAY CREST WHICH IS REPORTED AT EL. 503.13

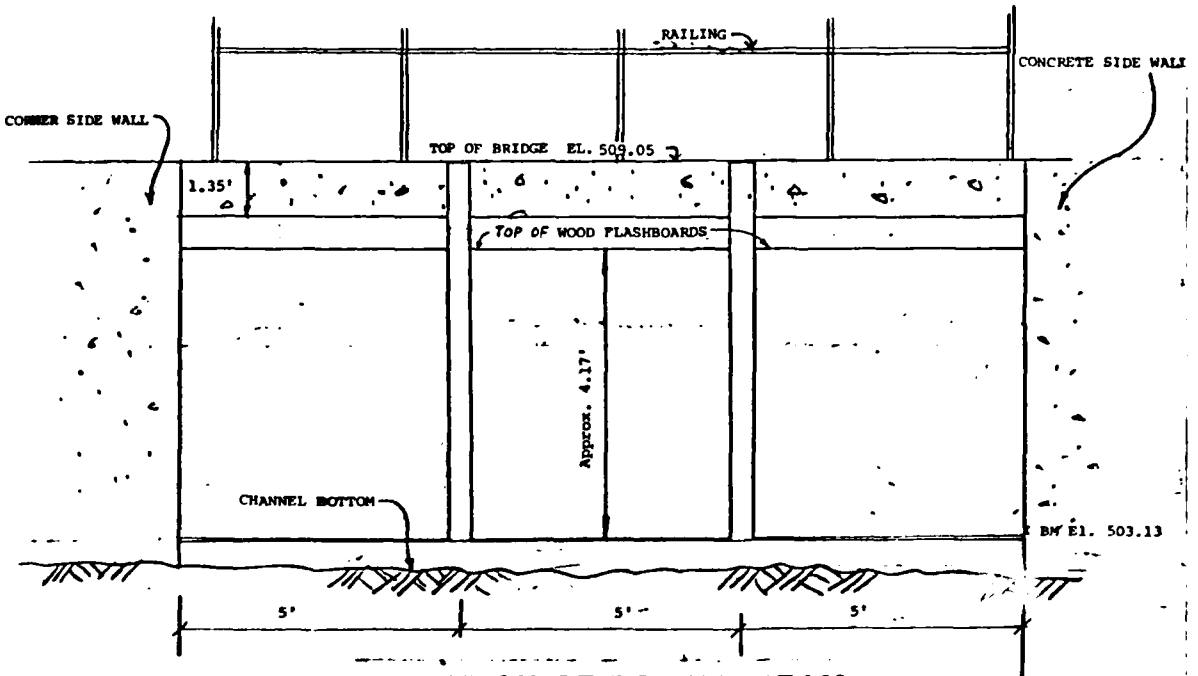
PLAN AND SECTIONS
NO NAME 53 (00809) DAM
MORRISTOWN MORRIS COUNTY, N.J.

LANGAN ENGINEERING ASSOCIATES, INC.
990 CLIFTON AVENUE CLIFTON, N.J. 07013

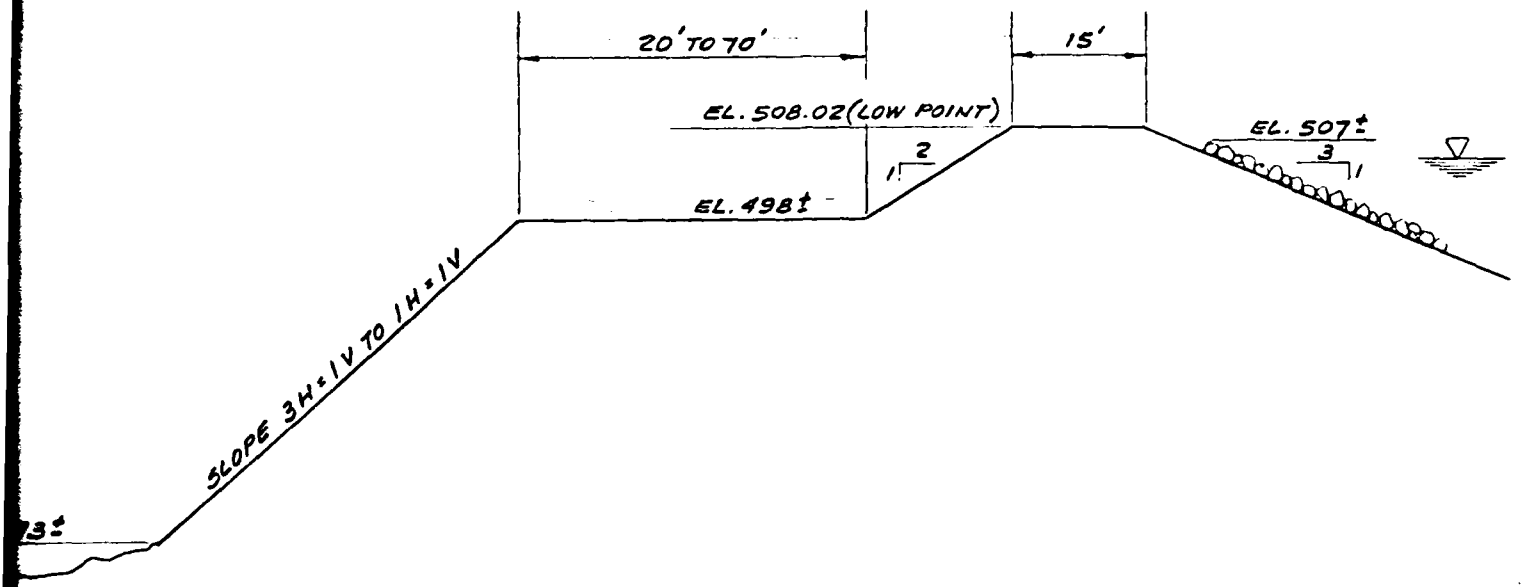
DRN. BY: V.U.	SCALE: N.T.S.	JOB No. 80145
CK'D. BY: P.Y.	DATE: 9-15-80	FIG. No. 2



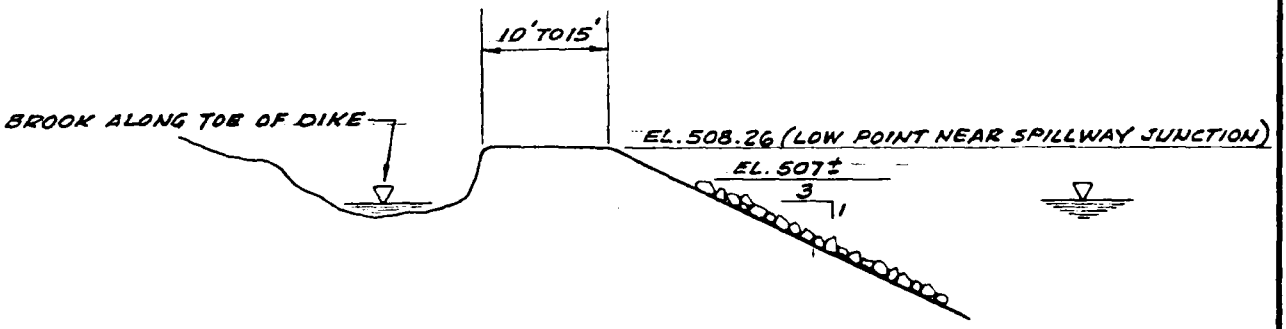
PLAN OF SPILLWAY



ELEVATION OF DOWNSTREAM SPILLWAY FACE



TYPICAL DAM PROFILE



TYPICAL DIKE PROFILE

TYPICAL PROFILES & SPILLWAY DETAILS NO NAME 53(00809) DAM MORRISTOWN — MORRIS COUNTY, N.J.		
LANGAN ENGINEERING ASSOCIATES, INC. 990 CLIFTON AVENUE CLIFTON, N.J. 07013		
DRN. BY: R.D.	SCALE: N.T.S.	JOB No. 80145
CK'D. BY: P.Y.	DATE: 9-15-80	FIG. No. 9

APPENDIX 1

HYDROLOGIC AND HYDRAULIC DATA

VISUAL INSPECTION CHECK LIST

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 6.5 Ac. Grassed high ground and slopes around reservoir

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 507.3 (70 Ac-ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A

ELEVATION MAXIMUM DESIGN POOL: 508.02 (Assumed top of dam)

ELEVATION TOP DAM: 508.02

CREST: Flashboard over spillway weir

a. Elevation 507.3 (Top of flashboards)
b. Type overfall - 2½ inch flashboards
c. Width 2½ inch
d. Length 15 ft
e. Location Spillover Between dam and auxiliary dike (NE corner of reservoir)
f. Number and Type of Gates None

OUTLET WORKS: Effluent pipe for water supply

a. Type 12 inch diameter pipe
b. Location Near centerline of dam underneath embankment
c. Entrance inverts Unknown
d. Exit inverts Unknown
e. Emergency draindown facilities One 12-inch blow-off reported to exist

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 22 cfs (Present spillway capacity)

Check List
Visual Inspection
Phase 1

Name Dam No Name No. 53 County Morris State New Jersey Coordinators NJ DEP

Date(s) Inspection See Below (8/29/80) Weather Warm & Hazy Temperature Mid 70's °F (8/29/80)

Pool Elevation at Time of Inspection 506.2* M.S.L. Tailwater at Time of Inspection No water discharge from reservoir

*Elevation obtained from field measurements using a BM El. 503.13 at the crest of the spillway (Spillway controlled by flashboards about 4.17 ft high)

Inspection Personnel:

P. Yu 8/29/80, 11/6/80, 11/12/80
R. Greene 11/12/80
V. Urban 8/26/80, 8/29/80
D. Leary 11/12/80
M. Ladd 8/26/80

Peter Yu Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE OBSERVED.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE OBSERVED.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	EROSION AT EAST HALF OF EMBANKMENT DOWNSTREAM SLOPE AND CREST OF SECONDARY DIKE NEAR SPILLWAY. EROSION ALSO ALONG TOE OF DIKE DUE TO STREAM FLOW.	EROSION AT CREST OF SECONDARY DIKE NEAR SPILLWAY SHOULD BE PROPERLY FILLED. CHANNEL AND BANK PROTECTION SHOULD BE PROVIDED ALONG BROOK AT DOWNSTREAM TOE OF DIKE.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	SECONDARY DIKE: PORTION NEAR SPILLWAY IS WINDING AND HAS UNLEVEL CREST.	
RIPRAP FAILURES	NONE OBSERVED.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANIMAL BURROW	ANIMAL BURROWS (ONE MEASURES 34" DEEP & 6 IN DIA) EXIST 50' TO 100' FROM SPILLWAY ON UPPER DOWNSTREAM SLOPE OF MAIN EMBANKMENT. ANIMAL BURROW 1 1/2' DIA AT CREST OF SECONDARY DIKE ABOUT 350 FT FROM SPILLWAY.	ANIMAL BURROWS SHOULD BE FILLED.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	SIGNIFICANT EROSION AT JUNCTION OF SPILLWAY AND SECONDARY DIKE.	ERODED AREA SHOULD BE PROPERLY FILLED.
ANY NOTICEABLE SEEPAGE	NONE OBSERVED.	
STAFF GAGE AND RECORDER	NONE OBSERVED.	
DRAINS	NONE OBSERVED.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	2 1/2" - FLASH BOARDS PLACED OVER CONCRETE WEIR. NO FLOW OVER FLASH BOARD EXCEPT SEEPAGE BETWEEN BOARDS AND CONCRETE WEIR. SILTATION AND LEAVES COVER UPSTREAM PORTION AND CANNOT BE INSPECTED.	
APPROACH CHANNEL	APPEARED SATISFACTORY.	
DISCHARGE CHANNEL	OBSTRUCTION SUCH AS SAND AND SCATTERED BOULDERS, ASPHALT AND PIPES. CONCRETE LINING OF DISCHARGE CHANNEL BADLY DETERIORATED.	OBSTRUCTIONS SHOULD BE CLEARED AND CHANNEL LINING REPAIRED.
BRIDGE AND PIERS	4' WIDE CONCRETE WALKWAY OVER SPILLWAY. HAIR LINE TO 1/2 inch CRACKS NEAR ABUTMENT.	REPAIR CRACKS.
OTHERS	SPALLING OF CONCRETE ON BOTH UPSTREAM WING WALLS.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	RIPRAP OBSERVED NEAR WATER SURFACE IN MOST AREAS. SLOPES GRASSED ABOVE RIPRAP.	
SEDIMENTATION	MODERATE SILTATION NEAR SPILLWAY.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	SAND, SCATTERED GRAVEL, COBBLES, METAL PIPE, WOOD, BROKEN CONCRETE LININGS, AND SMALL PILE OF ASPHALT IN CHANNEL. UP TO 1/4-IN CRACKS ON EAST CHANNEL RETAINING WALL, SLIGHT BULGE.	REMOVE DEBRIS. REPAIR CHANNEL.
SLOPES	MODERATELY STEEP.	
APPROXIMATE NO. OF HOMES AND POPULATION	NO HOMES IMMEDIATELY DOWNSTREAM. HEAVILY POPULATED ABOUT 3000 FT DOWNSTREAM.	

APPENDIX 2

PHOTOGRAPHS

Upper dam embankment and berm looking west. 6 November 1980

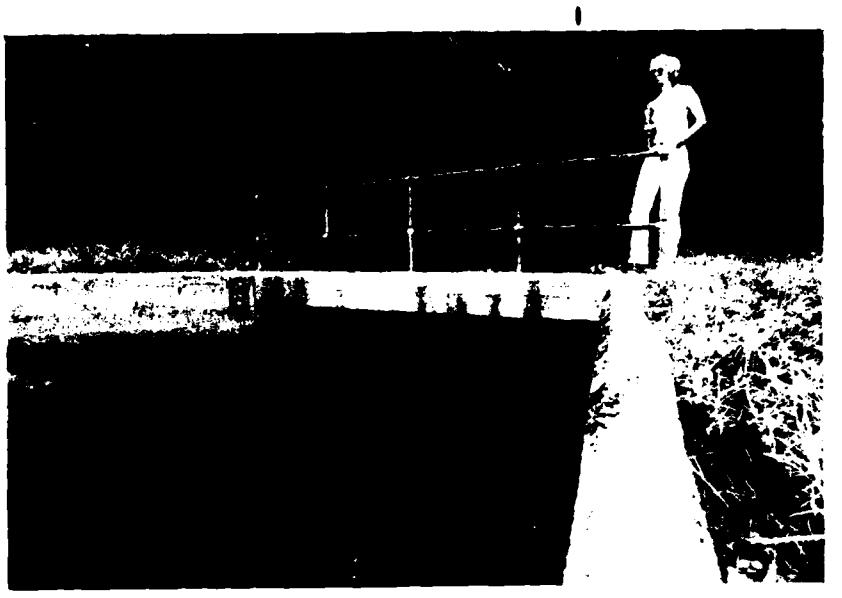
Upper dam embankment and berm looking east. 6 November 1980

Animal burrow in face of downstream embankment above the berm.

29 August 1980

Debris covered pit for effluent pipe control. Note entrance shaft for emergency low level outlet control located in upper left corner of photograph.

6 November 1980



Concrete walkway over spillway, upstream side. 29 August 1980

Spillway controlled by flashboards. Note sedimentation and boulders along discharge flume. 29 August 1980

Deteriorated concrete slab of discharge flume. 29 August 1980

Dike along east side of reservoir looking north. Brook flows along east side of dike to spillway discharge flume. 11 November 1980

Reservoir looking downstream. 6 November 1980

APPENDIX 3

HYDROLOGICAL COMPUTATIONS

LANGAN ENGINEERING ASSOCIATES, INC.

HYDROLOGIC COMPUTATIONS

N.J. NO NAME 53 DAM

A. Location: Morris County, N.J.

B. Drainage area: 6.5 Acres (0.01 sq. mi.)

C. Area of Lake: 4 Acres

D. Classification:

Size – small (height < 40')

Hazard – high

E. Spillway Design Flood – PMF chosen in accordance with COE's recommended guideline.

F. PMP

1. Dam is located in Zone 6 (close to boundary of zone 1)

PMP = 22.3 inches (200 sq mi – 24 hrs, "all season envelope", HMR #33)

2. PMP must be adjusted for basin size

Duration	% Factor (for 10 sq mi) Zone 6	Zone 1	Use	Reduction Factor*
0-6	112	111	112	
0-12	123	123	123	0.80
0-24	132	133	133	

* page 48 "Design of Small Dams"

3: Adjusted PMP

Duration (hrs)	Adj. Factor	Total PMP, inches	Incremental PMP, inches
0-6	1.12 × 0.8 = 0.90	20.1	20.1
0-12	1.23 × 0.8 = 0.98	21.9	1.8
0-24	1.33 × 0.8 = 1.06	23.6	1.7

BY PJG DATE 11/11/80 No Name 53 JOB NO. 80145

CKD. RWG DATE 5/81 SHEET NO. 1 OF

4. Distribution of maximum 6-hours by the standard EM-1110-2-1411 method

Duration (hrs)	% 6-hr. PMP.	Dist. PMP (inches)
1	10	2.01
2	12	2.41
3	15	3.02
4	38	7.64
5	14	2.81
6	11	2.21

5. Rank the four 6-hour increments of PMP

6-hr increment	Incremental PMP.	Rank
1st	20.1	1
2nd	1.8	2
3rd	1.0 (assumed)	3
4th	0.7 (assumed)	4

6. Arrange the four 6-hr increments ranked 1, 2, 3 and 4 in the order 4, 2, 1, 3 (EC1110-2-163 revised 5 Nov. 74)

7. 24-hr distribution as follows

Duration, hrs	Dist. PMP (inches)
0-6	0.7
6-12	1.8
12-13	2.01
13-14	2.41
14-15	3.02
15-16	7.64
16-17	2.81
17-18	2.21
18-24	1.0

LANGAN ENGINEERING ASSOCIATES, INC.

G. Computation of inflow hydrograph

$Q = \left(\frac{P \cdot A}{t} \times 1.01\right)_{cfs}$ where P is precipitation in inches
A = catchment area in Ac.
t = time in hours

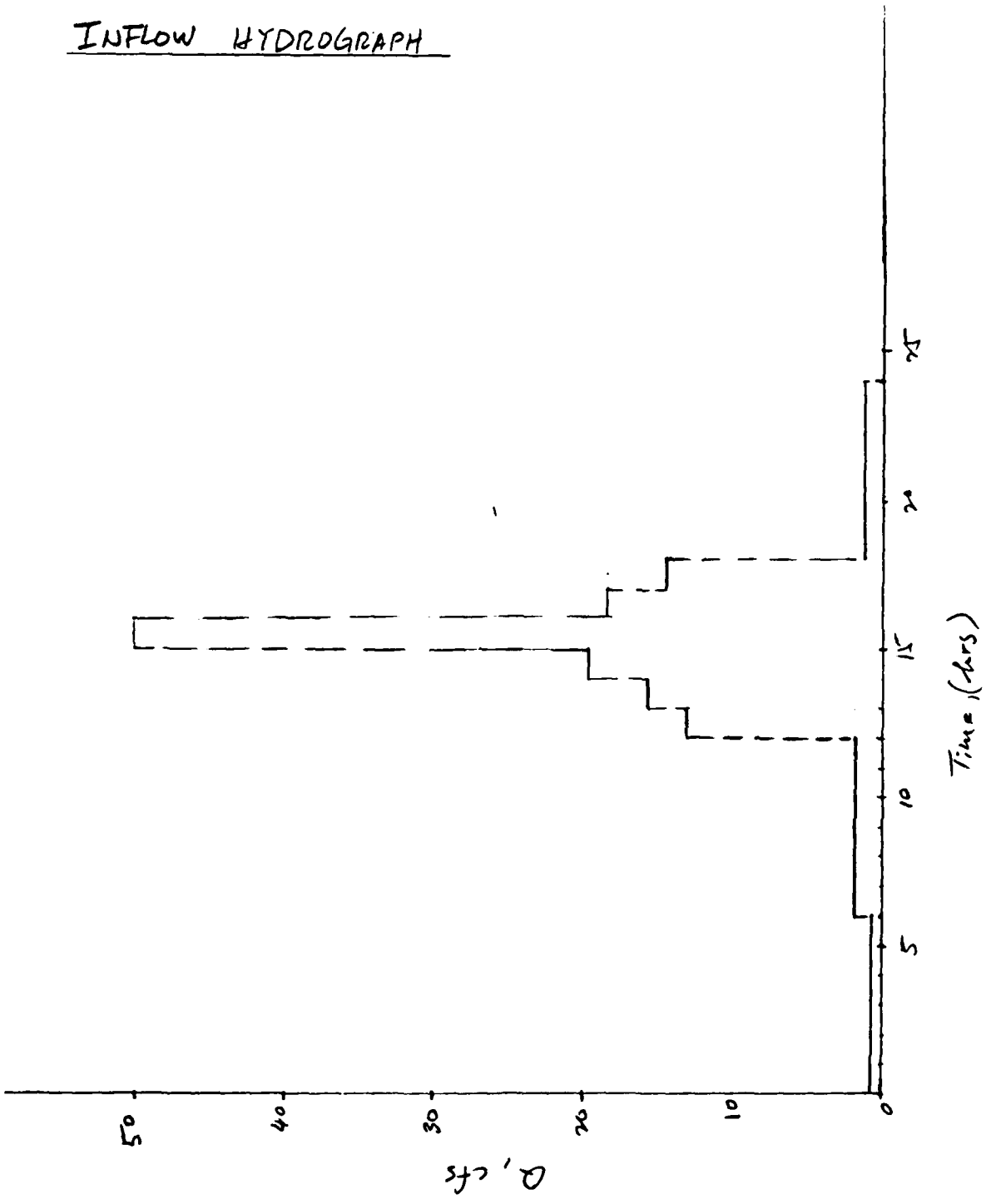
Duration, hr.	Q, cfs
0-6	0.77
6-12	1.97
12-13	13.20
13-14	15.82
14-15	19.83
15-16	50.16
16-17	18.45
17-18	14.51
18-24	1.09

Input inflow hydrograph to HEC-1 DB
Use 15 min interval.
Plot of inflow hydrograph is shown on next page.

BY Py DATE 5/89 No Name 53 Dam JOB NO. 80145
CKD RWG DATE 5/01 SHEET NO. 3 OF

LANGAN ENGINEERING ASSOCIATES, INC.

INFLOW HYDROGRAPH

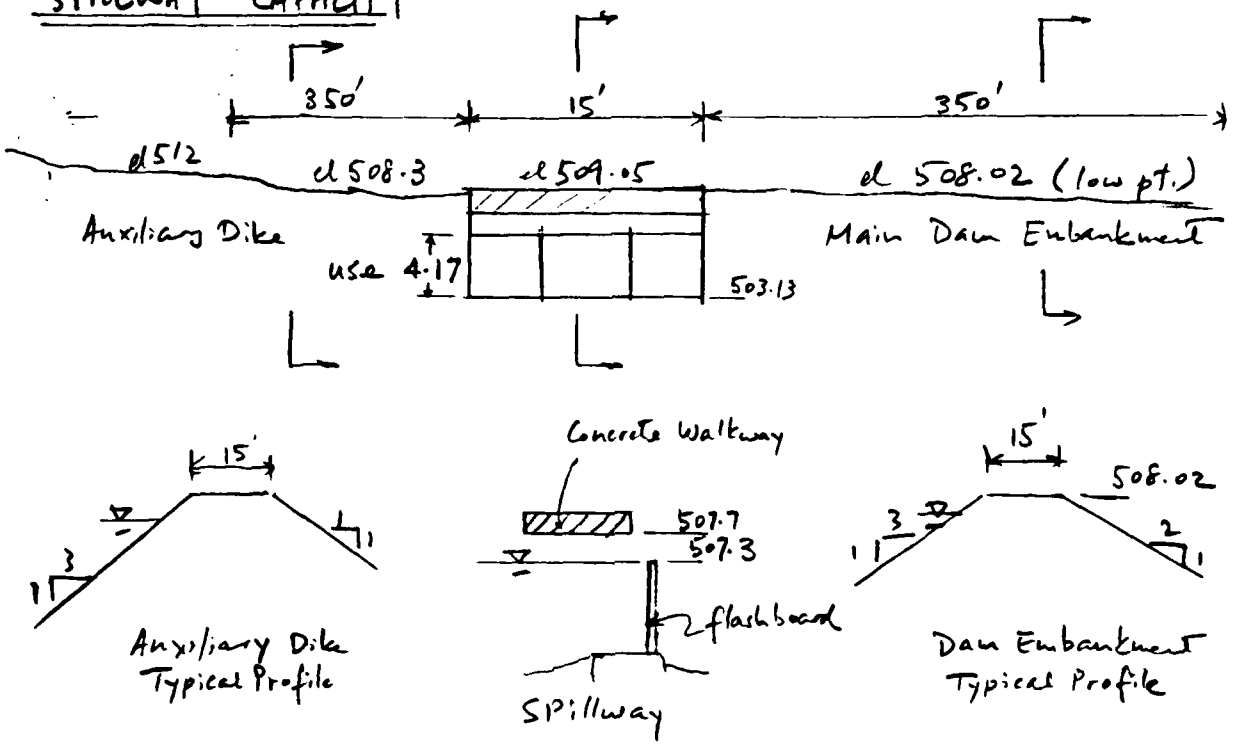


BY DMJ DATE 5/81 No Name 53 Dam JOB NO. 80145

CKD RBG DATE 5/81 SHEET NO. 4 OF

LANGAN ENGINEERING ASSOCIATES, INC.

SPILLWAY CAPACITY



At spillway section, when pool surface is below bottom of concrete walkway (el 507.7), discharge over flashboards is weir flow. Take spillway section as a broad-crested weir. Choose C from Table 5-3 of 'Handbook of Hydraulics' by King & Brater (5th Ed.) Take $C = 3.32$

When pool surface is above el 509.05, discharge includes orifice flow between bottom of walkway and top of flashboard and weir flow over walkway and dam. Assume average $C = 0.62$ for orifice flow and use values of C from Table 5-3 of King & Brater

Dam and dike sections are similar to weir of trapezoidal section. Use ave. $C = 2.80$ (Table 5-9 on page 5-46 of King & Brater)

BY DJ DATE 11/13/80 No Name 53 Dam JOB NO. 80145
CKD RWG DATE 5/81 SHEET NO. 5 OF

LANGAN ENGINEERING ASSOCIATES, INC.

Elev. (ft)	Spillway						Main Dam		Auxiliary Dike		Total Q_T (cfs) $= Q_s + Q_D + Q_d$
	Orifice Flow		Weir Flow			Q_s (cfs) $= Q_{so} + Q_{sw}$					
	H (ft)	Q_{so} (cfs)	H (ft)	c	Q_{sw} (cfs)		H (ft)	Q_D (cfs)	H (ft)	Q_d (cfs)	
507.3	–		0			0					0
507.7*	0.2	13.35	0.4	3.32	12.60	12.60					13
508.02**	0.52	21.53	0.72		–	21.53	0	0			22
508.3	0.8	26.70	1		–	26.70	0.28	145.20	0	0	172
509.05	1.55	37.16	0		0	37.16	1.03	1024.43	0.75	636.53	1698
510.3	2.8	49.95	1.25	2.67	55.97	105.92	2.28	3373.87	2	2771.86	6252
512.3	4.5	63.32	3.25	2.74	240.81	304.13	4.28	8677.44	4	7840	16822

$$Q_{so} = CA\sqrt{2gH} = 0.62 \times 15 \times 0.4\sqrt{2 \times 32.2 \times H} = 29.85\sqrt{H}$$

$$Q_{sw} = CLH^{3/2} = 15CH^{3/2}$$

$$Q_D = CLH^{3/2} = 2.80 \times 350 \times H^{3/2} = 980H^{3/2}$$

$$Q_d = CLH^{3/2} = 2.80 \times 350 \times H^{3/2} = 980H^{3/2}$$

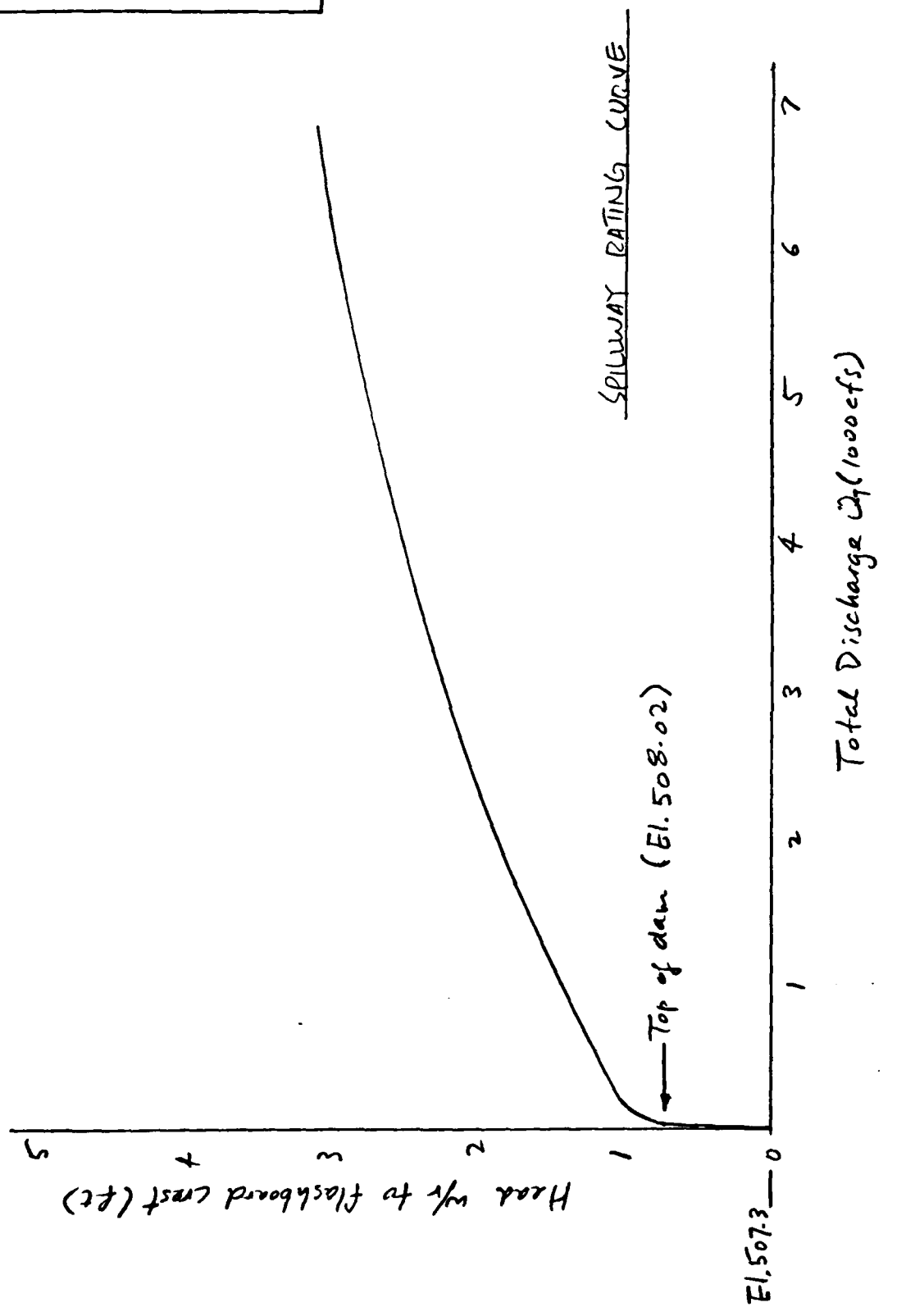
* Bottom of walkway. use Q_{so} or Q_{sw} for Q_s whichever is smaller

** Top of dam

BY: [illegible] DATE: 11/13/80 No Name 53 Dam JOB NO. 80145

CKD: RWG DATE: 5/81 SHEET NO. 6 OF ____

LANGAN ENGINEERING ASSOCIATES, INC.



BY DJ DATE 11/13/80 No Name 53 Dam JOB NO. 81125

CKD RWG DATE 5/81 SHEET NO. 7 OF

LANGAN ENGINEERING ASSOCIATES, INC.

Reservoir Storage Capacity

Assume a linear distribution for the area of the lake with elevation. Start at a zero storage at the crest of the spillway (flashboard)

Area of lake = 4 Ac.

Length of equivalent square = 417 ft.

Take average side slope above normal pool = 1V : 2.5H

∴ for every foot of water above the crest of spillway the length of the equivalent square increases by

= 1 × 2.5 × 2 = 5 ft

Elev. (ft)	H (ft)	Length of Equivalent Square (ft)	Area of Lake (Acres)
507.3	0	417	4
508.02	0.72	420.6	4.06
509.3	2	427	4.19
512.3	5	442	4.48

Storage capacity vs. elevation to be calculated by HEC-1-DB

BY [illegible] DATE 11/13/00 No Name 53 Dam JOB NO. 80145

CKD RWG DATE 5/01 SHEET NO. 8 OF

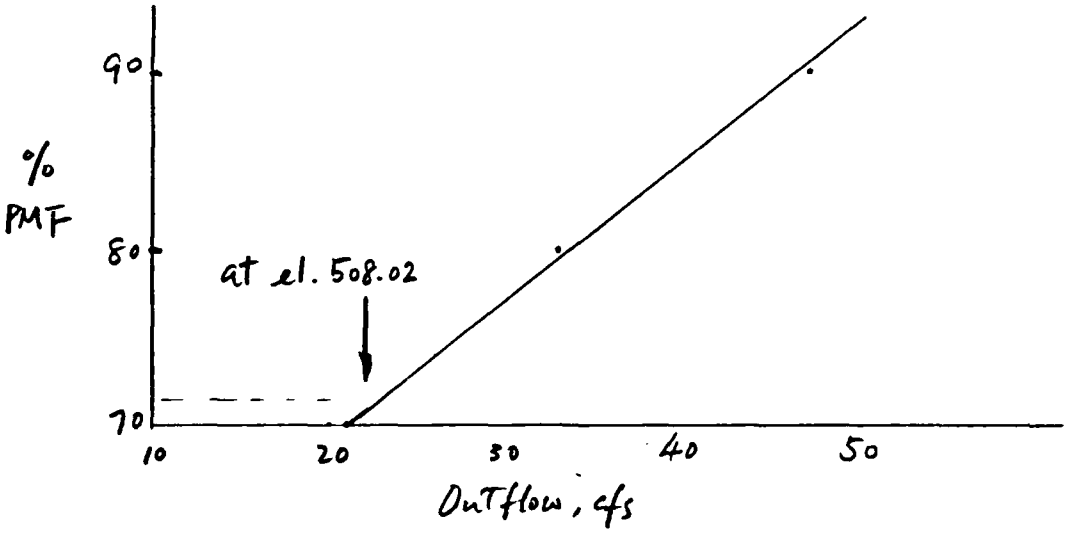
LANGAN ENGINEERING ASSOCIATES, INC.

SUMMARY OF HYDROGRAPH AND FLOOD ROUTING

1. Inflow hydrograph was input and routing calculated by HEC-1 DB
2. PMF for No Name 53 is 50 cfs.
3. Routing indicates dam will overtop by approximately 0.06ft for PMF and will not overtop for ½ PMF

OVERTOPPING POTENTIAL

1. Various % of PMF have been routed using HEC-1 DB
2. Plot peak outflow vs. % PMF



3. Dam overtops at el 508.02 with Q = 22 cfs
   ∴ dam can pass approximately 71% of the PMF

BY DJ	DATE 11/13/80	No Name 53 Dam	JOB NO. 80145
CKD RWG	DATE 5/81		SHEET NO. 9 OF

LANGAN ENGINEERING ASSOCIATES, INC.

DRAWDOWN ANALYSIS

1. Outlet structures

   a. The 12"-dia effluent pipe feeding to water supply system

   b. The reported existence of the 12"-dia emergency blow-off pipe underneath the dam. (assumed operable)

2. Drawdown capacity

   a. 12"-dia effluent pipe

      normal daily consumption rate : 700,000 gallons (2.15 Ac-ft)

   b. 12"-dia blow-off –

      Pipe located underneath dam; elevation and length unknown. Estimate daily discharge rate by assuming

      Length = 200 ft

      Average water head = 20 ft

$$Q = A\sqrt{\frac{2gH}{1+K_m+K_pL}}$$ using $A = \frac{\pi}{4}\times 1^2 = 0.785\ ft^2$

$K_m = K_e + K_b \doteq 0.9$

using $n = 0.02$, $K_p = 0.0741$

(Ref: NEH Section 5, ES-42)

$$Q = 0.785\sqrt{\frac{64.4\times 20}{1+0.9+0.074\times 200}}$$

$= 6.89$ cfs $\doteq 13.7$ Ac-ft/day

Total drawdown capacity $= (2.15 + 13.7)$ Ac-ft/day

$= 15.85$ Ac-ft/day say 15 Ac-ft/day

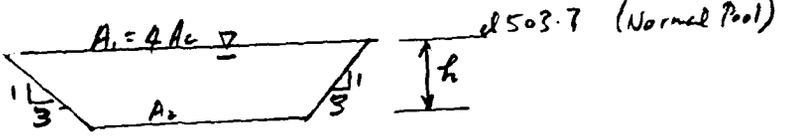
3. Virtually no drainage area

   ∴ no inflow

BY Dyc	DATE 11/14/80	No Name 53 Dam	JOB NO. 80145
CKD RWG	DATE 5/81		SHEET NO. 10 OF

LANGAN ENGINEERING ASSOCIATES, INC.

4 Assuming a linear distribution for the lake area with elevation and using the equivalent square method



for $h = 5'$

$A_2 = 3.44$ Ac.

$$\text{Capacity} = \frac{4 + 3.44}{2} \times 5 = 18.6 \text{ Ac-ft}$$

$$\therefore \text{time required} = \frac{18.6}{15} = 1.24 \text{ say } 1\tfrac{1}{2} \text{ days.}$$

∴ the reservoir can be lowered 5 ft from top of flashboard in about 1½ day.

for $h = 10'$

$A_2 = 2.93$ Ac

$$\text{Capacity} = \frac{4 + 2.93}{2} \times 10 = 34.6 \text{ Ac-ft}$$

$$\therefore \text{time required} = \frac{34.6}{15} = 2.3 \text{ say } 2\tfrac{1}{2} \text{ days}$$

∴ the reservoir can be lowered 10 ft from top of flashboard in about 2½ days.

Note: Drawdown capacity for the 1st 4 ft can be greatly increased by removing the flashboard.

BY DJ DATE 11/14/80 No Name 53 Dam JOB NO. 80111

CKD DWG DATE 5/81 SHEET NO. 11 OF

HEC-1 OUTPUT

NO NAME 53 DAM

```
NJ530UT    08:36 MAY 27,'81

1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************
     1                A1                    NJ NO NAME 53  (00809)
     2                A2                    INFLOW HYDROGRAPHY AND ROUTING
     3                A3                    N.J. DAM INSPECTION
     4                B     96       0       15       0       0       0       0       0       0       0
     5                B1     3
     6                K      0       1                                       1
     7                K1 INPUT HYDROGRAPH
     8                M     -1              0.01                    1.00
     9                N   0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77
    10                N   0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77    0.77
    11                N   0.77    0.77    0.77    0.77    1.97    1.97    1.97    1.97    1.97    1.97
    12                N   1.97    1.97    1.97    1.97    1.97    1.97    1.97    1.97    1.97    1.97
    13                N   1.97    1.97    1.97    1.97    1.97    1.97    1.97    1.97   13.20   13.20
    14                N  13.20   13.20   15.82   15.82   15.82   15.82   19.83   19.83   19.83   19.83
    15                N  50.16   50.16   50.16   50.16   18.45   18.45   18.45   18.45   14.51   14.51
    16                N  14.51   14.51    1.09    1.09    1.09    1.09    1.09    1.09    1.09    1.09
    17                N   1.09    1.09    1.09    1.09    1.09    1.09    1.09    1.09    1.09    1.09
    18                N   1.09    1.09    1.09    1.09    1.09    1.09
    19                K      1       2                                       1
    20                K1 ROUTING COMPUTATIONS
    21                Y                              1
    22                Y1     1                                                       -1
    23                Y4507.30  507.70  508.02  508.30  509.05  510.30  512.30
    24                Y5     0      13      22     172    1698    6252   16822
    25                $A  4.00    4.06    4.19    4.48
    26                $E507.30  508.02  509.30  512.30
    27                $$507.30
    28                $D508.02
    29                K     99
1                              PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                      RUNOFF HYDROGRAPH AT          1
                                      ROUTE HYDROGRAPH TO           2
                                      END OF NETWORK


1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************

 RUN  DATE= 81/05/27.
      TIME= 08.35.35.


                                      NJ NO NAME 53  (00809)
                                      INFLOW HYDROGRAPHY AND ROUTING
                                      N.J. DAM INSPECTION

                                                JOB SPECIFICATION
                                 NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                                 96        0       15        0        0        0        0        0        0        0
                                                       JOPER      NWT   LROPT   TRACE
                                                           7        0       0       0
```

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INPUT HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	.01	0.00	.01	1.00	0.000	0	0	0

INPUT HYDROGRAPH

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	13.	13.
13.	13.	16.	16.	16.	16.	20.	20.	20.	20.
50.	50.	50.	50.	18.	18.	18.	18.	15.	15.
15.	15.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.				

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	50.	22.	6.	6.	619.
CMS	1.	1.	0.	0.	18.
INCHES		20.23	23.99	23.99	23.99
MM		513.73	609.28	609.28	609.28
AC-FT		11.	13.	13.	13.
THOUS CU M		13.	16.	16.	16.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING COMPUTATIONS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	-1

STAGE	507.30	507.70	508.02	508.30	509.05	510.30	512.30
FLOW	0.00	13.00	22.00	172.00	1698.00	6252.00	16822.00
SURFACE AREA=		4.	4.	4.	4.		
CAPACITY=		0.	3.	8.	21.		
ELEVATION=		507.	508.	509.	512.		

CREL	CPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL

507.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
508.0	0.0	0.0	0.

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.15	1	.25	1.	0.	0.	507.3
1.01	.30	2	.50	1.	0.	0.	507.3
1.01	.45	3	.75	1.	0.	0.	507.3
1.01	1.00	4	1.00	1.	0.	0.	507.3
1.01	1.15	5	1.25	1.	0.	0.	507.3
1.01	1.30	6	1.50	1.	0.	0.	507.3
1.01	1.45	7	1.75	1.	1.	0.	507.3
1.01	2.00	8	2.00	1.	1.	0.	507.3
1.01	2.15	9	2.25	1.	1.	0.	507.3
1.01	2.30	10	2.50	1.	1.	0.	507.3
1.01	2.45	11	2.75	1.	1.	0.	507.3
1.01	3.00	12	3.00	1.	1.	0.	507.3
1.01	3.15	13	3.25	1.	1.	0.	507.3
1.01	3.30	14	3.50	1.	1.	0.	507.3
1.01	3.45	15	3.75	1.	1.	0.	507.3
1.01	4.00	16	4.00	1.	1.	0.	507.3
1.01	4.15	17	4.25	1.	1.	0.	507.3
1.01	4.30	18	4.50	1.	1.	0.	507.3
1.01	4.45	19	4.75	1.	1.	0.	507.3
1.01	5.00	20	5.00	1.	1.	0.	507.3
1.01	5.15	21	5.25	1.	1.	0.	507.3
1.01	5.30	22	5.50	1.	1.	0.	507.3
1.01	5.45	23	5.75	1.	1.	0.	507.3
1.01	6.00	24	6.00	1.	1.	0.	507.3
1.01	6.15	25	6.25	2.	1.	0.	507.3
1.01	6.30	26	6.50	2.	1.	0.	507.3
1.01	6.45	27	6.75	2.	1.	0.	507.3
1.01	7.00	28	7.00	2.	1.	0.	507.3
1.01	7.15	29	7.25	2.	1.	0.	507.3
1.01	7.30	30	7.50	2.	1.	0.	507.3
1.01	7.45	31	7.75	2.	2.	0.	507.3
1.01	8.00	32	8.00	2.	2.	0.	507.3
1.01	8.15	33	8.25	2.	2.	0.	507.3
1.01	8.30	34	8.50	2.	2.	0.	507.4
1.01	8.45	35	8.75	2.	2.	0.	507.4
1.01	9.00	36	9.00	2.	2.	0.	507.4
1.01	9.15	37	9.25	2.	2.	0.	507.4
1.01	9.30	38	9.50	2.	2.	0.	507.4
1.01	9.45	39	9.75	2.	2.	0.	507.4
1.01	10.00	40	10.00	2.	2.	0.	507.4
1.01	10.15	41	10.25	2.	2.	0.	507.4
1.01	10.30	42	10.50	2.	2.	0.	507.4
1.01	10.45	43	10.75	2.	2.	0.	507.4
1.01	11.00	44	11.00	2.	2.	0.	507.4
1.01	11.15	45	11.25	2.	2.	0.	507.4
1.01	11.30	46	11.50	2.	2.	0.	507.4
1.01	11.45	47	11.75	2.	2.	0.	507.4
1.01	12.00	48	12.00	2.	2.	0.	507.4
1.01	12.15	49	12.25	13.	3.	0.	507.4
1.01	12.30	50	12.50	13.	4.	1.	507.4
1.01	12.45	51	12.75	13.	6.	1.	507.5
1.01	13.00	52	13.00	13.	7.	1.	507.5
1.01	13.15	53	13.25	16.	8.	1.	507.5
1.01	13.30	54	13.50	16.	9.	1.	507.6
1.01	13.45	55	13.75	16.	10.	1.	507.6
1.01	14.00	56	14.00	16.	11.	1.	507.6
1.01	14.15	57	14.25	20.	12.	1.	507.7

1.01	14.30	58	14.50	20.	15.	2.	507.7
1.01	14.45	59	14.75	20.	14.	2.	507.7
1.01	15.00	60	15.00	20.	15.	2.	507.8
1.01	15.15	61	15.25	50.	18.	2.	507.9
1.01	15.30	62	15.50	50.	22.	3.	508.0
1.01	15.45	63	15.75	50.	54.	3.	508.1
1.01	16.00	64	16.00	50.	51.	3.	508.1
1.01	16.15	65	16.25	18.	32.	3.	508.0
1.01	16.30	66	16.50	18.	21.	3.	508.0
1.01	16.45	67	16.75	18.	21.	3.	508.0
1.01	17.00	68	17.00	18.	21.	3.	508.0
1.01	17.15	69	17.25	15.	21.	3.	508.0
1.01	17.30	70	17.50	15.	20.	3.	507.9
1.01	17.45	71	17.75	15.	20.	3.	507.9
1.01	18.00	72	18.00	15.	19.	3.	507.9
1.01	18.15	73	18.25	1.	18.	2.	507.9
1.01	18.30	74	18.50	1.	16.	2.	507.8
1.01	18.45	75	18.75	1.	14.	2.	507.7
1.01	19.00	76	19.00	1.	12.	1.	507.7
1.01	19.15	77	19.25	1.	10.	1.	507.6
1.01	19.30	78	19.50	1.	9.	1.	507.6
1.01	19.45	79	19.75	1.	8.	1.	507.5
1.01	20.00	80	20.00	1.	7.	1.	507.5
1.01	20.15	81	20.25	1.	6.	1.	507.5
1.01	20.30	82	20.50	1.	5.	1.	507.5
1.01	20.45	83	20.75	1.	5.	1.	507.4
1.01	21.00	84	21.00	1.	4.	1.	507.4
1.01	21.15	85	21.25	1.	4.	0.	507.4
1.01	21.30	86	21.50	1.	3.	0.	507.4
1.01	21.45	87	21.75	1.	3.	0.	507.4
1.01	22.00	88	22.00	1.	3.	0.	507.4
1.01	22.15	89	22.25	1.	3.	0.	507.4
1.01	22.30	90	22.50	1.	2.	0.	507.4
1.01	22.45	91	22.75	1.	2.	0.	507.4
1.01	23.00	92	23.00	1.	2.	0.	507.4
1.01	23.15	93	23.25	1.	2.	0.	507.4
1.01	23.30	94	23.50	1.	2.	0.	507.4
1.01	23.45	95	23.75	1.	2.	0.	507.4
1.02	0.00	96	24.00	1.	2.	0.	507.4

PEAK OUTFLOW IS 54. AT TIME 15.75 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	54.	20.	7.	7.	628.
CMS	2.	1.	0.	0.	18.
INCHES		18.39	24.33	24.33	24.33
MM		467.03	618.07	618.07	618.07
AC-FT		10.	13.	13.	13.
THOUS CU M		12.	16.	16.	16.

********** ********** ********** ********** **********

1

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	1	50.	22.	6.	6.	.01
	(	1.42)(	.62)(	.18)(	.18)(	.03)

ROUTED TO 2 39. 20. 7. 7. .04
(1.54)(.56)(.19)(.19)(.03)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	STORAGE	507.30	507.30	508.02
	OUTFLOW	0.	0.	3.
		0.	0.	22.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.00	508.08	.06	3.	54.	.75	15.75	0.00

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
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NJ53RUT    09:03 MAY 27,'81

1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 7?
 **********************************
1                              PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                       RUNOFF HYDROGRAPH AT          1
                                       ROUTE HYDROGRAPH TO           2
                                       END OF NETWORK


1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************

 RUN  DATE= 81/05/27.
      TIME= 09.03.22.


                                       NJ NO NAME 53  (00809)
                                       INFLOW HYDROGRAPHY AND ROUTING
                                       N.J. DAM INSPECTION

                                                JOB SPECIFICATION
          NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
          96        0       15        0        0        0        0        0        4        0
                                    JOPER      NWT   LROPT    TRACE
                                        5        0        0        0


                                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                              NPLAN= 1 NRTIO= 5 LRTIO= 1
            RTIOS=     .90     .80     .70     .50     .30


***********          ***********          ***********          ***********          ***********

                                          SUB-AREA RUNOFF COMPUTATION

      INPUT HYDROGRAPH

                        ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                            1       0       0       0       0       0       1       0       0

                                                HYDROGRAPH DATA
           IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO   ISNOW   ISAME   LOCAL
              -1        0      .01     0.00      .01     1.00    0.000       0       0       0


***********          ***********          ***********          ***********          ***********

                                          HYDROGRAPH ROUTING

      ROUTING COMPUTATIONS
```

ISTAW	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	-1

STAGE	507.30	507.70	508.02	508.30	509.05	510.30	512.30
FLOW	0.00	13.00	22.00	172.00	1698.00	6252.00	16822.00
SURFACE AREA=	4.	4.	4.	4.			
CAPACITY=	0.	3.	8.	21.			
ELEVATION=	507.	508.	509.	512.			

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
507.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
508.0	0.0	0.0	0.

PEAK OUTFLOW IS 47. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 33. AT TIME 16.00 HOURS

PEAK OUTFLOW IS 21. AT TIME 16.25 HOURS

PEAK OUTFLOW IS 15. AT TIME 16.25 HOURS

PEAK OUTFLOW IS 9. AT TIME 16.25 HOURS

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .90	RATIO 2 .80	RATIO 3 .70	RATIO 4 .50	RATIO 5 .30
HYDROGRAPH AT	1	.01	1	45.	40.	35.	25.	15.
		(.03)		(1.28)(	1.14)(	.99)(	.71)(	.43)(
ROUTED TO	2	.01	1	47.	33.	21.	15.	9.
		(.03)		(1.34)(	.93)(	.58)(	.42)(	.26)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	507.30	507.30	508.02
STORAGE	0.	0.	3.
OUTFLOW	0.	0.	22.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.90	508.07	.05	3.	47.	.75	16.00	0.00
.80	508.04	.02	3.	33.	.50	16.00	0.00
.70	507.97	0.00	3.	21.	0.00	16.25	0.00
.50	507.77	0.00	2.	15.	0.00	16.25	0.00
.30	507.58	0.00	1.	9.	0.00	16.25	0.00

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

APPENDIX 4

REFERENCES

APPENDIX 4

REFERENCES

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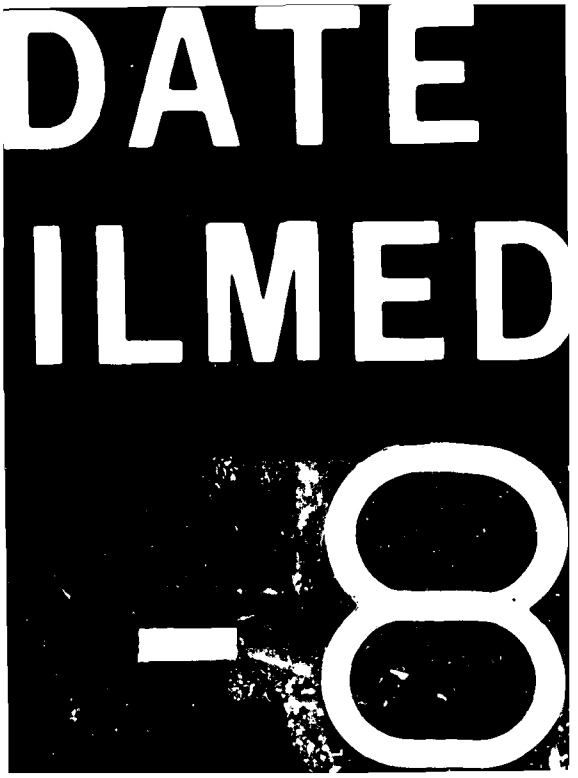
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